



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

NOTICES OF SOME NEW PARASITIC INFUSORIA.

BY ALFRED C. STOKES, M.D.

WHILE making a microscopical examination of the intestinal and stomach contents of young spadefoot hermit toads (*Scaphiopus holbrooki*), whose life-history Dr. C. C. Abbott is studying, I observed two forms of apparently undescribed endoparasitic Infusoria so crowding the rectum that it seemed only a thin walled tube surrounding a semi-solid, writhing mass which, viewed with a low power objective, brought to mind the idea of a shimmering cloud of heated air, or a wavering flame of colorless fire, through which here and there glistened a yellow spark.

The rectum of toads and frogs has long been a kind of happy hunting ground for endoparasites, especially for the Opalinæ; but so far as I am aware only colorless species of the genus have been observed. In this instance, however, the yellow points within that living mass proved to be Opalinæ of a lemon-yellow tint. The periphery and, to a much less extent, the deeper portion of the endoplasm are tinged, the color, which appears to be a stain and not an aggregation of particles, being collected in a layer near the cuticular surface, with a quite sharply defined line of demarkation between the lower margin and the internal body-sarcode.

The infusorian is broadly ovate, soft and flexible and somewhat changeable in shape, assuming at will a subpyriform or subglobose figure. The surface is indented by obliquely disposed striæ which bear the long and fine vibratile cilia clothing the creature. Scattered through the endoplasm are numerous refringent corpuscles mingled with many larger spherical bodies having the aspect of vacuoles. The former may be portions of the nucleus, as that constituent is known to break into corpuscular parts with age, and to become scattered as the infusorian matures. Nothing else corresponding to an endoplast was observed, even after using reagents. There is no trace of a mouth. Nutriment is probably absorbed from the intestinal fluids in which the animalcule delights to live. The contractile vesicle is also absent.

Its numbers are not great; perhaps a dozen were noted in the contents of the rectum. Neither is it always to be found. Compared with its more numerous associates, however, this yellow creature is a giant among pygmies, and it rotates through the

mass with a carelessness as to results quite in keeping with its bulk. It measures from $\frac{1}{88}$ to $\frac{1}{86}$ inch in length.

On account of the color it may be named *Opalina flava*, and the following description, in connection with its habitat within the rectum of the rarest of our batrachians, will probably be sufficient for its identification. It is shown in Fig. 1 magnified about 235 diameters:

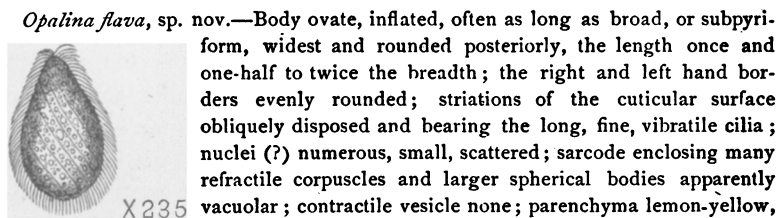


FIG. 1.—*Opalina flava*, sp. nov. The color darkest near the periphery, where it is disposed in a layer, the central portion of the sarcoderm being comparatively colorless. Length, $\frac{1}{88}$ to $\frac{1}{86}$ inch. Habitat, the rectum of the spade-foot hermit toad, *Scaphiopus holbrooki*.

The intestinal fluid seemed thickened by the throng of bacteria, bacilli, vibriones and spirilla accompanying the *Opalinae*; and associated with them was not only the undescribed flagellate zoöid to be referred to presently, but a large species of *Opalina*, which I have, after some hesitation, identified with *O. ranarum* Purk. Their appearance and structure are those of the latter, but the size is much less. They are quite active. As they pressed each other beneath the surface or forced each other upward, the aspect of the field of view was comically like a pool of furiously boiling soup with big dumplings bobbing about.

Associated with this crowd was a somewhat more interesting flagellate infusorian. It, in common with most endoparasites, is colorless, and very soft and flexible. Its structure is so different from all other creatures in so many particulars that a new genus is needed to receive it. In its habitat it seems restricted to the rectum. Very seldom, if ever, is it captured wandering into the upper intestine. Its form is more or less ovoid, usually tapering to a somewhat pointed anterior extremity, and its consistency seems scarcely greater than the white of an egg. The three anterior vibratile flagella, about equaling the body in length, are of extreme tenuity, their three-fold aspect appearing only after the most careful scrutiny of the weakened or dying infusorian. In the active animal their rapid motion suggests the existence of

cilia, or, when momentarily seen, they appear as a single filament.

Extending along the entire length of one lateral border is a narrow, rapidly undulating membrane, very readily mistaken for a spirally twisting flagellum. Its free edge seems to be thickened, and its line of insertion on the body has the appearance of a distinct filament or ridge. That this usually conspicuous line is not a flagellum is proved by its invariable adherence to the surface. It has never been observed to lift itself or to exhibit independent movement; it always follows the contortions of the body and always keeps the same relative position in reference to the margin of the undulating membrane. It is, however, very liable to be confounded with a long, thread-like filament which springs from the terminal margin of the membrane. This appendage, unique in its position, seems to have no individual freedom of motion, but follows and completes the undulations of the tissue to which it is attached, as the lash follows the brandished whip-stock. That it has no other connection with the body proper I am convinced, although it is as fine and as difficult to satisfactorily examine as are the three anteriorly inserted flagella.

The parenchyma is usually more or less vacuolar. It becomes conspicuously so when surrounded by water, the vesicles varying in size and often changing their position rapidly. A true pulsating vacuole is absent. The nucleus is also obscure. Occasionally a small refringent disc, usually structureless, rarely granular, is noticeable near the center of one lateral border, and may be the endoplast.

Longitudinally traversing the zoöid from the apex to the posterior extremity, where it conspicuously projects, is a flexible, somewhat curved and rod-like body, enlarged at its origin, thence of a constant width to the distal end where it becomes suddenly acuminate. The point of exit from the sarcode is well marked, the cuticular surface occasionally appearing to surround it for a short distance like a sheath. When the animal is immersed in pure water it becomes shortened and permanently fusiform, and this rod then protrudes an increased length which small protoplasmic drops often cover. What the function and constitution of this motionless and refringent structure may be, it is difficult to conjecture.

No oral aperture is visible. Very rarely a few small dark-

bordered granules are noticeable within the body, but if they are of external origin their mode of entrance is unknown.

Although existing in such profusion I have observed their reproduction in but a single instance. The cause is probably the ease with which they lose their health in water. They are tenacious of life, however, individuals living for twenty-four hours within a rectum in a life-slide, but water does not agree with them. Multiplication took place with amazing rapidity. A drop of sarcode separated from the posterior extremity of the body quickly followed by another, both immediately assuming a spherical form and both almost immediately rupturing and with some force shooting out a zoöid less than one-fourth the parent's size and with the undulating membrane less developed, but otherwise resembling it. Fission, encystment, rupture and escape were all accomplished in less than two seconds. I have witnessed this but once, as stated, yet before seeing it I had repeatedly observed an act whose significance I failed to appreciate until it had been examined in the reflected light of the completed process. It is, that a portion of the posterior extremity of the animalcule fre-

quently becomes separated, but immediately undergoes disintegration or diffuence, and probably represents an attempt at reproduction made incomplete by unpropitious surroundings. The multitudinous young are much smaller than the adults, more spindle-shaped and more active.

Fig. 2 represents the mature endoparasite magnified 1100 diameters.



FIG. 2.—*Exechlyga acuminata*, gen. et sp. nov.

EXECHLYGA (εἰσεχλῆς, *projecting from*; λυγός, *a pliant rod*), gen. nov.—Animalcules free-swimming, soft and flexible, ovate; three long, subequal, vibratile flagella produced from the anterior extremity; an undulating membrane developed along one lateral border; a motionless rod-like body traversing the zoöid longitudinally and projecting beyond the posterior extremity; oral aperture none; contractile vesicle absent. Habits, endoparasitic.

Exechlyga acuminata, sp. nov.—Body ovate, widest and rounded posteriorly, tapering to the somewhat pointed anterior apex; length two and one-half to three times the width; parenchyma often vacuolar, colorless; anterior flagella three, as long as the body, subequal and fine; undulating membrane narrow, its margin apparently thickened, the line of insertion usually conspicuous, and its posterior border terminating in a fine filament subequal to the zoöid in length; internal rod-like body curved, anteriorly enlarged, the distal

extremity of the posteriorly projecting portion suddenly acuminate. Length of body $\frac{1}{1000}$ inch. Habitat, the rectum of the spade-foot hermit toad, *Scaphiopus holbrookii*.

Another infusorian, which lives more or less in the light of the sky, but suffers and often^d dies when forced to leave its host, occurs not uncommonly as an ectoparasite on the social rotifer *Megalotrocha*. I have taken it in considerable numbers on colonies obtained from widely separated localities and at long intervals. This season the rotifers have seemed especially abundant and the colonies particularly luxuriant. The infusorian glides rapidly over the surface of the host, often passing from one individual to another, and running to the edge of the ciliary disc, whence a current from a neighboring rotifer occasionally sweeps it into the surrounding water. If carried so far beyond the influence of the currents that it fails to find its way back to the colony, it soon begins to show evidence of uncongenial surroundings. Its form changes, it becomes swollen, pale and ghostly, its cilia act irregularly and the creature speedily dies, the rotifers' cuticular secretions seeming necessary for its welfare.

The ectoparasite referred to belongs to Stein's *Hypotricha* and to Ehrenberg's genus *Chilodon*. It differs from the cosmopolitan *Chilodon cucullulus* (Mull.) Ehr., in form and size, in the absence of the sharply pointed anterior extremity or lip, in the greater curvature of the pharynx, in the course of the adoral channel, that of *C. cucullulus* being directed forward and outward from the pharyngeal orifice, and especially in its ectoparasitic habits. The convexity of the dorsal surface varies. In some individuals it is evenly rounded; in others conspicuously flattened and often traversed by irregularly transverse grooves or channels. The curvature of the pharyngeal armature is also variable.

When the parasite is gliding over the host's surface it is not possible to observe the manner of taking food. But individuals having been swept into the water and been brought back by the return current, have occasionally settled on the cover-glass in such a position that the process was apparent. When feeding from the side of a rotifer or from the retracted and rounded extremity, the anterior end becomes much narrowed and elongated, while the pharynx is protruded and closely applied to the surface which it infests.

Reproduction is by both transverse and longitudinal fission. In Fig. 3 is represented the ventral, and in Fig. 4 the lateral aspect magnified about 600 diameters. To designate the species it may appropriately bear the name of the host and be *Chilodon megalotrochæ*.

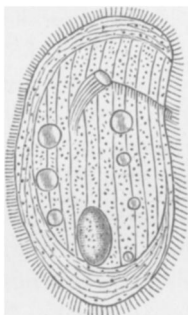


Fig. 3.

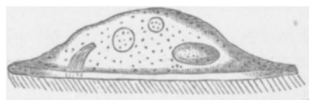


Fig. 4.

FIG. 3.—*Chilodon megalotrochæ*, n. sp., ventral aspect. $\times 600$. FIG. 4.—*Chilodon megalotrochæ*, lateral aspect. $\times 600$.

Chilodon megalotrochæ sp. nov.—Body soft, flexible, ovate, the length once to once and one-half the breadth, somewhat widest posteriorly; the anterior and posterior extremities rounded, the left hand border slightly concave near the anterior apex; lip short, obtuse, inconspicuously directed toward the left; dorsal surface convex, naked, the ventral one flat, finely striated and entirely clothed with short, vibratile cilia, those of the anterior extremity somewhat more conspicuous; the adoral groove shallow, directed backward and outward from the pharyngeal orifice, its cilia under insufficient amplification presenting the aspect of a single projecting seta; nucleus ovate, granular, mesially placed in the posterior body-half; pharyngeal armature more or less curved; contractile vesicles numerous, scattered. Length of body $\frac{1}{400}$ to $\frac{1}{350}$ inch. Habitat, ectoparasitic on the social rotifer *Megalotrocha*.

—:O:—

GROWTH, ITS CONDITIONS AND VARIATIONS.

BY CHARLES MORRIS.

IN the story of organic life there is nothing more remarkable than the extraordinary diversity in size between mature animals and plants. The question may well be asked why, in one case, an animal is full grown on attaining the size of an ant, while another gains the bulk of an elephant or whale; and why the lowly moss fails to attain the size of its giant brother, the oak. It might be simply answered that this is a mere question of nutrition, some forms being better adapted to obtain food than others. But the question cannot be disposed of so